

## Seven New Species of Chironomid Midges (Diptera, Chironomidae) from the Ohta River, Japan

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### Abstract

The distribution of the chironomid larvae in the Ohta River, Hiroshima Prefecture, was studied at 12 stations covering almost the entire length of the stream by the method in which male adults emerging from bottom samples were identified.

As a result, a total of 97 species was recorded, at least 12 of which are regarded as new species.

Seven of these new species belonging to 5 genera, i.e., *Cricotopus*, *Microtendipes*, *Polypedilum*, *Rheotanytarsus* and *Tanytarsus* were described. In addition, brief comments were made on the larval habitats of 3 of these species.

### 1. Introduction

The larvae of chironomids, or non-biting midges, are distributed in a variety of inland waters such as rivers, lakes, swamps, paddy fields, artificial containers, and even in tide pools, and are usually the major components of the aquatic insect community. They include large numbers of species, and their distribution has been shown to be an excellent indicator of the physical, chemical and biological qualities of water, including the degree of pollution of the river and lake waters. Systematic surveys of the distribution of the chironomids along the entire length of Tama River, Tokyo, were made by SASA and coworkers (1980, 1981, 1983), and a total of 88 species including a number of new or previously unrecorded ones was described. In these surveys, it was shown that the distribution of each chironomid species was highly correlated with the degree of pollution of the river with sewage waters. Another systematic survey of the chironomid fauna was made on the Ohta River in Hiroshima Prefecture (KAWAI and TAKAHASHI, in press). As a result of this study, a total of 97 species was recorded from 12 collection sites along the entire length of the stream, and the distribution of the species in relation to the physical characteristics of the stream was discussed.

In the present paper, 7 new species among the collection are described on the basis of the morphology of the adult males reared in the

laboratory from the bottom sediment samples of the Ohta River.

### 2. Materials and Methods

Figure 1 shows the locations of the sampling stations for the chironomid larvae in the Ohta River. Various types of substrate samples such as stones, sand, mud and waterweeds were collected at each station, transported to the laboratory and transferred into plastic containers (30 cm in diameter). The containers were filled with water to about 10 cm level, covered with nylon nets and aerated rather vigorously at room temperature. The adults emerging from the samples were collected every day for about 2 months, the males of which were mounted in gum-chloral and identified by the methods described in SASA *et al.* (1980). All the materials studied, including the type materials, have been temporarily deposited in the Laboratory of Bacteriology and Immunology, Faculty of Medicine, Toyama Medical and Pharmaceutical University, Japan.

The abbreviations in the descriptions of species mean the following measurements and ratios cited from SASA (1983a).

- BL: body length, the combined length of thorax and abdomen, in mm
- WL: wing length, from base of vein R to tip of wing, in mm
- AR: antennal ratio, length of last segment divided by combined length of the preceding segments, not including

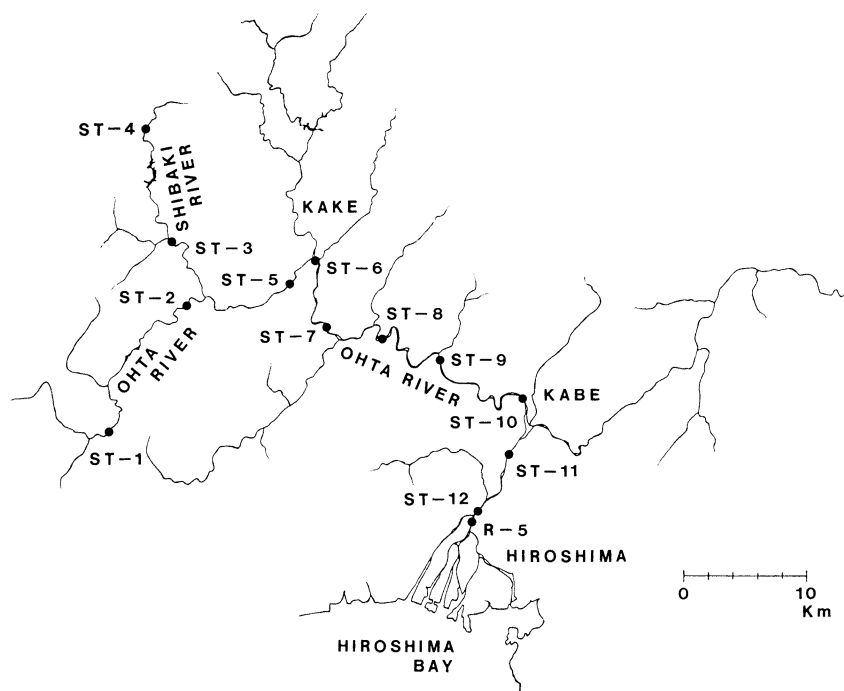


Fig. 1. Sampling stations for chironomid larvae in Ohta River.

- pedicel
- ER: eye ratio, distance between eyes divided by height of eye
- so: number of supraorbital setae
- cl: number of clypeal setae
- pn: number of lateral pronotal setae
- dm: number of dorsomedial setae of scutum
- dl: number of dorsolateral setae of scutum
- sa: number of supra-alar setae
- sc: number of scutellar setae
- sq: number of fringe setae of squama
- LR1: length of front tarsus I divided by length of front tibia
- LR2: length of middle tarsus I divided by length of middle tibia
- LR3: length of hind tarsus I divided by length of hind tibia
- TR1: length of front tarsus V divided by length of front tibia
- BR1: length of longest hair on front tarsus I divided by diameter of front tarsus I at the base of the hair
- BR2: do, middle tarsus I
- BR3: do, hind tarsus I

### 3. Description of Adult Males

#### 3-1. SUBFAMILY ORTHOCLADIINAE

##### *Cricotopus brevilobus* sp. nov.

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume dark brown. Scutal ground brown. Scutal stripes dark brown, rather inconspicuous. Shoulders pale yellow. Scutellum and postnotum dark brown. Legs as in Fig. 2A. Femora brown to dark brown, basally more or less paler. Bases and apical 1/5 to 1/4 of all tibiae light brown to brown. Fore tarsi uniformly brown. Middle and hind tarsi distally slightly darkened. Abdominal tergites as in Fig. 2B. Tergites I and II largely pale yellow; II slightly darkened on lateral margins. Tergites III–IX dark brown to black; VI and VII caudomedially pale. Abdominal sternites largely pale yellow; VIII, oral halves of V, VI and VII dark brown to black.

Structure: Standard measurement data in Table 1-A. Antenna with 13 flagellar segments; AR 1.19–1.31. Eyes with conspicuous dorso-medial projections; ER 0.76–0.83. Thorax with 17–23 dorsomedial setae, 12–18 dorsolateral setae and 7–10 scutellar setae. Wing as in Fig. 2C.

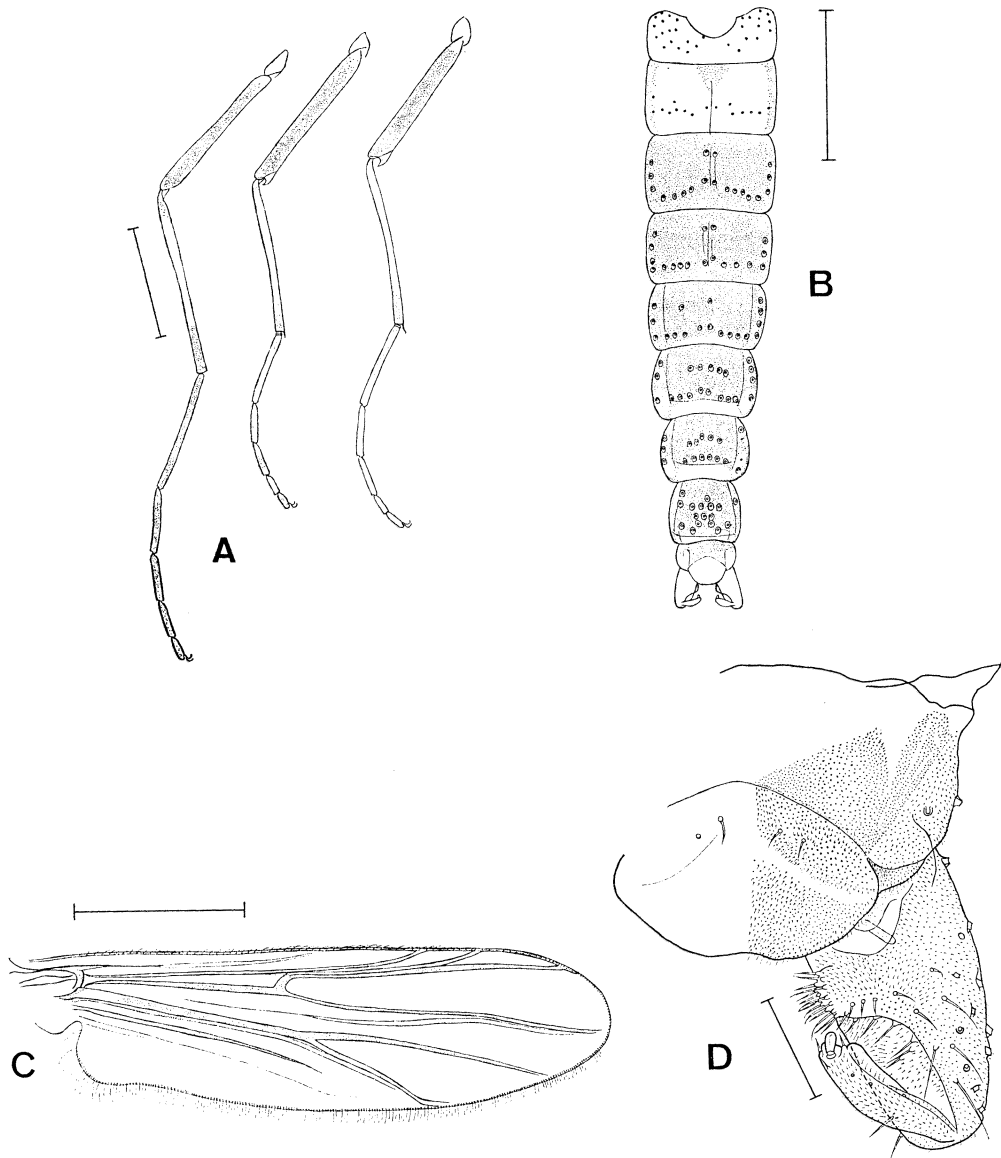


Fig. 2. *Cricotopus brevilobus* sp. nov.

A, Legs; B, Abdominal tergites; C, Wing; D, Hypopygium.

Scale: 0.5 mm in Figs. A–C, 0.05 mm in Fig. D.

Squama with 4–8 fringe setae. Anal lobe well developed. Costa ending slightly beyond tip of  $R_{4+5} \cdot R_{2+3}$  ending about midway between ends of  $R_1$  and  $R_{4+5}$ .  $fCu$  well beyond  $r-m$ .  $LR1$  0.62–0.69. Pulvilli absent. Abdominal tergites with highly reduced numbers of hairs as in Fig. 2B. Hypopygium as in Fig. 2D. Inner lobe of gonocoxite single, broad, with rounded

margin and without any indication of another lobe.

Size: BL 2.56–2.97 mm. WL 1.29–1.56 mm.

Larval habitat: Surface of stones or gravels at rapids in mid and lower reaches of river.

Type material: Holotype ♂ emerged from a sample collected at ST-9 (45 m), 10. VI. 1982 (KAWAI); paratypes 3 ♂ from the same

sample as holotype, 5♂ from ST-10 (15 m), the same date and collector as holotype.

Discussion: This species is closely related to *Cricotopus pulchripes* Verrall in the body coloration and the distribution of the setae on the abdominal tergites. However, it clearly differs from *C. pulchripes* in that the inner lobe of gonocoxite is single, without any indication of small posterior lobe and not projected on posterior margin. It also differs in having uniformly brown fore tarsi.

### 3-2. SUBFAMILY CHIRONOMINAE

#### 3-2-1. TRIBE CHIRONOMINI

##### *Microtendipes truncatus* sp. nov.

Coloration (in specimen mounted in gum-chloral): Almost entirely pale yellow. Antennal shaft and plume brown. Fore tibia, fore tarsi, distal half of fore femur and basal halves of middle and hind tibiae yellowish pale brown.



Fig. 3. Male hypopygium of *Microtendipes truncatus* sp. nov.  
Scale: 0.05 mm.

Abdominal tergites distally slightly darkened.

Structure: Standard measurement data in Table 1-B. Frontal tubercles absent. Antenna with 13 flagellar segments; AR 1.26–1.45. Eyes with conspicuous dorsomedial projections; ER 0.26–0.40. Anteprepronotum reduced in the middle and overhung by anterior projection of scutum. Dorsomedial setae only 2, situated at the apex of the scutal cone. Wing membrane without dark or cloudy marks. Anal lobe moderately developed, with rounded margin. Squama fringed with 4–6 setae.  $R_{2+3}$  running very close to  $R_1$ . fCu far beyond r-m. LR1 1.47–1.56. Front tibia with 2 long subterminal setae (about  $150\mu$  long), and without apical scale. Pulvilli vestigial. Abdominal segment VIII rectangular, not constricted in the middle. Hypopygium as in Fig. 3. Anal point parallel-sided and apically truncate. Appendage 1 large, broad and with 3–5 dorsal setae and a basal tubercle bearing a long seta. Appendage 2 straight, distally tapered, apically pointed and with a basal cluster of several tubercles each bearing a long seta, representing a rudimentary appendage 2a. Gonostylus slender and with concave inner margin.

Size: BL 2.93–3.58 mm. WL 1.45–1.70 mm.

Type material: Holotype ♂ emerged from a sample collected at ST-8 (90 m), 29. VIII. 1981 (KAWAI); paratypes 4♂ from ST-5 (200 m), the same date and collector as holotype, 3♂ from ST-6 (180 m), the same date and collector as holotype, ♂ from ST-1 (600 m), 28. VIII. 1981 (KAWAI), ♂ from ST-7 (120 m), the same date and collector as holotype.

Discussion: This species is closely related to *Microtendipes rydalenensis* (Edwards) in the body coloration and the shape of appendage 1 of the hypopygium. However, it is easily distinguished from *M. rydalenensis* by having an apically truncate anal point, distally tapered appendage 2 and concave inner margin of gonostylus. In addition, it is smaller in size and higher in LR1 (WL 3.3 mm and LR1 1.3 in *M. rydalenensis* according to EDWARDS, 1929).

##### *Polypedilum hirosshimaense* sp. nov.

Coloration (in specimen mounted in gum-chloral): Almost uniformly pale yellow. Antennal shaft and plume brown. Pedicel pale brown. Fore tarsi II–V and apical half of fore tarsus I yellowish pale brown.

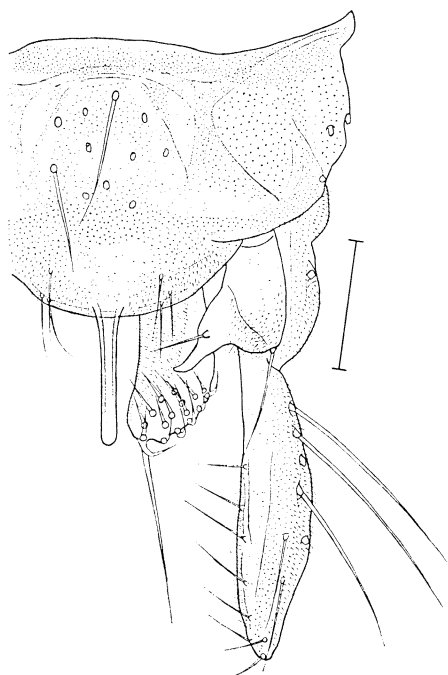


Fig. 4. Male hypopygium of *Polypedilum hiroshimaense* sp. nov.  
Scale: 0.05 mm.

Structure: Standard measurement data in Table 1-C. Frontal tubercles absent. Antenna with 13 flagellar segments; AR 1.42–1.69. Eyes with long dorsomedial projections; ER 0.29–0.38. LR1 1.74–1.92. Terminal scale of fore tibia apically rounded. Pulvilli well developed, bifurcate. Wing membrane without dark or cloudy marks. Squama with 6–12 fringe setae. Anal lobe moderately developed, with rounded margin.  $R_{2+3}$  running very close to  $R_1$ . fCu much beyond r-m. Hypopygium as in Fig. 4. Anal point more or less chitinized, long, parallel-sided and with rounded apex. Dorsal appendage without basal setae and composed of a lateral pubescent lobe bearing a long apical seta and a medial beak-like process with a long seta at about middle. Ventral appendage apically slightly expanded and with rather convex apical margin.

Size: BL 2.82–3.44 mm. WL 1.43–1.58 mm.

Type material: Holotype ♂ emerged from a sample collected at ST-3 (500 m), 28. VIII. 1981 (KAWAI); paratypes 11 ♂ emerged from the same sample as holotype, 5 ♂ from ST-2 (350 m), the same date and collector as

holotype.

Discussion: This species is closely related to *Polypedilum convictum* (Walker) in the body coloration and the general structure of the hypopygium. However, it clearly differs from *P. convictum* in that the beak-like process of dorsal appendage has a distinct seta and that the ventral appendage is apically rather convex. In addition, it has smaller size and higher LR1 (WL about 2.8 mm and LR1 1.5–1.7 in *P. convictum* according to EDWARDS, 1929).

*Polypedilum parviacumen* sp. nov.

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume brown. Pedicel light brown. Anteprenotum dark brown. Scutal ground yellowish pale brown. Medial scutal stripe light brown, indistinct. Lateral scutal stripes brown, more or less conspicuous. Prescutellar area slightly darkened. Scutellum pale brown. Postnotum dark brown. Halteres pale yellow. Legs almost uniformly pale yellow. Abdominal tergites largely pale brown; tergites III and IV with oral and caudal narrow brown bands; V–VII with oral narrow brown band; VIII and IX brown.

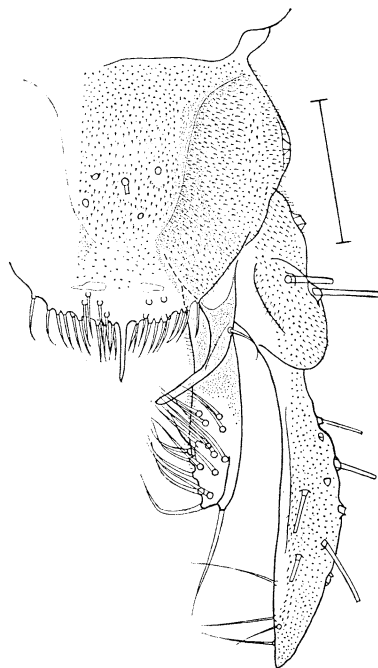


Fig. 5. Male hypopygium of *Polypedilum parviacumen* sp. nov.  
Scale: 0.05 mm.

Structure: Standard measurement data in Table 1-D. Frontal tubercles absent. Antenna with 13 flagellar segments; AR 0.89–0.96. Eyes with long dorsomedial projections; ER 0.28–0.40. LR1 2.00–2.16. Terminal scale of fore tibia apically sharply pointed and with a long seta (about  $150\mu$  long) at the base. Pulvilli well developed, bifurcate. Wing membrane without dark or cloudy marks. Squama fringed with 3 or 4 setae. Anal lobe moderately developed, with rounded margin.  $R_{2+3}$  running well separated from both  $R_1$  and  $R_{4+5}$ , ending far distal to tip of  $R_1$ . fCu far beyond r-m. Hypopygium as in Fig. 5. 9th tergite with rounded posterior margin and with a little chitinized terminal setae. Anal point extremely weak, apically pointed. Dorsal appendage half chitinized, narrow, sickle-shaped, without basal setae and with a short lateral seta at about basal 1/3. Ventral appendage slender and almost parallel-sided.

Size: BL 2.21–2.44 mm. WL 1.13–1.19 mm.

Larval habitat: Sand or mud at pools in mid and lower reaches of river.

Type material: Holotype ♂ emerged from a sample collected at ST-8, 10. VI. 1982 (KAWAI); paratypes 4♂ from ST-10, the same date and collector as holotype, ♂ from ST-11 (10 m), 11. VI. 1982 (KAWAI).

Discussion: This species is unique among the species of this genus in having the poorly developed anal point.

### 3-2-2. TRIBE TANYTARSINI

#### *Rheotanytarsus fluminis* sp. nov.

Coloration (in specimen mounted in gum-chloral): Almost uniformly pale yellow. Antennal shaft and plume brown.

Structure: Standard measurement data in Table 1-E. Frontal tubercles absent. Antenna with 13 flagellar segments; AR 0.62–0.76. Eyes with long dorsomedial projections; ER 0.23–0.32. LR1 2.36–2.65. Fore tibia with a long sharply pointed apical scale. Terminal combs of middle and hind tibiae well separated, both with a long spur. Middle tarsus I with an apical row of 3–5 short spiny setae. Pulvilli small, vestigial. Wing almost cuneiform; numerous macrotrichiae on distal half, rather scanty on basal half.  $R_1$  and  $R_{4+5}$  running very close together;  $R_{2+3}$  obliterated. fCu far distal to r-m. Hypopygium as in Fig. 6. Anal point slender, parallel-sided and apically rounded. Appendage 1 with 2



Fig. 6. Male hypopygium of *Rheotanytarsus fluminis* sp. nov.

Scale: 0.05 mm.

short setae on inner margin and 3–6 short dorso-lateral setae; posterior margin produced into a more or less distinct beak. Appendage 1a rectangular, not reaching inner margin of appendage 1 and with a short seta on inner margin. Appendage 2 apically a little swollen and curved inwards. Appendage 2a very short, inwardly oriented at about right angle with anal point and with basal simple setae and distal several narrow lamellae. Gonostylus distally abruptly narrowed and curved ventrally.

Size: BL 2.16–2.55 mm. WL 1.13–1.21 mm.

Larval habitat: Surfaces of stones or gravels at rapids of river.

Type material: Holotype ♂ emerged from a sample collected at ST-9, 29. VIII. 1981 (KAWAI); paratypes 17♂ from the same sample as holotype.

Discussion: This species is closely related to *Rheotanytarsus tamatertius* Sasa and *Rheotanytarsus muscicola* Kieffer in the body coloration and the general structure of the hypopygium. However, it is easily distinguished from both the species by having a rectangular

appendage 1a. It also differs from *R. tamater-tius* in having a more slender anal point and from *R. muscicola* in that the appendage 2a is shorter, oriented inwards and has no distal plate. In addition, the present species has much higher LR1 than *R. muscicola* (LR1 1.8–1.9 in *R. muscicola* according to LEHMANN, 1969).

*Rheotanytarsus rivulophilus* sp. nov.

Coloration (in specimen mounted in gum-chloral): Almost uniformly pale yellow. Antennal shaft and plume brown.

Structure: Standard measurement data in Table 1-F. Frontal tubercles absent. Antenna with 13 flagellar segments; AR 0.63–0.77. Eyes with long dorsomedial projections; ER 0.33–0.39. LR1 2.21–2.52. Fore tibia with a long sharply pointed apical scale. Terminal combs of middle and hind tibiae well separated, both with a long spur. Middle tarsus I with an apical row of 3 or 4 short spiny setae. Pulvilli small, vestigial. Wing cuneiform; almost entirely densely covered with macrotrichiae.  $R_1$  and  $R_{4+5}$  running very close together;  $R_{2+3}$  obliterated. fCu far beyond r-m. Hypopygium as in Fig. 7. Anal point simple, apically slightly expanded. Appendage 1 oval, with 2 short setae on inner margin and with 4–6 short setae on lateral

margin. Appendage 1a small, scarcely reaching inner margin of appendage 1 and with a short seta at the base. Appendage 2 apically swollen. Appendage 2a basally bilobed and with several simple basal setae; basal lobe short, narrow and chitinized; distal lobe long, reaching far beyond tip of appendage 2 and with long membranous process along inner margin and several lanceolated ventral setae.

Size: BL 2.00–2.36 mm. WL 1.08–1.27 mm.

Type material: Holotype ♂ emerged from a sample collected at ST-4 (750 m), 28. VIII. 1981 (KAWAI); paratypes 26♂ from the same sample as holotype.

Discussion: This species appears to be somewhat related to *Rheotanytarsus kyotoensis* (Tokunaga) in the general structure of the hypopygium. However, it is easily distinguished from *R. kyotoensis* by having appendage 2a reaching far beyond tip of appendage 2 and bilobed basally.



Fig. 7. Male hypopygium of *Rheotanytarsus rivulophilus* sp. nov.  
Scale: 0.05 mm.

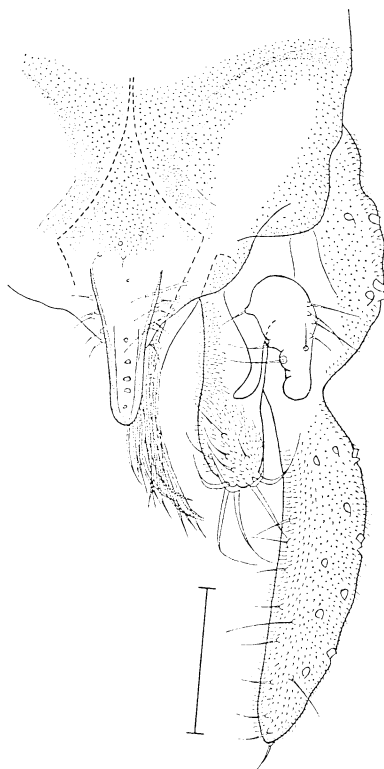


Fig. 8. Male hypopygium of *Tanytarsus takahashii* sp. nov.  
Scale: 0.05 mm.

*Tanytarsus takahashii* sp. nov.

Coloration (in specimen mounted in gum-chloral): Almost uniformly white to pale yellow. Antennal shaft and plume brown. Pedicel pale brown. All tibiae, fore tarsi and distal half of fore femur yellowish pale brown. Scutal ground white. Scutal stripes yellowish pale brown, indistinct. Postnotum pale brown.

Structure: Standard measurement data in Table 1-G. Frontal tubercles large, conical, 21–25  $\mu$  long and 8–11  $\mu$  wide. Antenna with 13 flagellar segments; AR 1.00–1.14. Eyes with conspicuous dorsomedial projections; ER 0.64–0.75. Thorax without dorsomedial setae. LR1 extremely high, 3.18. Fore tibia with a long sharply pointed apical scale. Terminal combs of middle tibia well separated; one comb with a long spur, the other with a rather short spur.

Terminal combs of hind tibia also well separated, both with a long spur. Middle tarsus I with an apical row of 5–7 short spiny setae. Pulvilli small, vestigial. Wing not cuneiform, anal lobe slightly developed; macrotrichiae rather dense on apical half, scanty on basal half.  $R_1$  and  $R_{4+5}$  running close together;  $R_{2+3}$  clearly separated from both  $R_1$  and  $R_{4+5}$  and ending a little before midway between ends of both veins. fCu much beyond r-m. Hypopygium as in Fig. 8. Anal point stout, with 3–9 clusters of short spines and without a field of microtrichiae on dorsal surface. Appendage 1 oriented backwards, swollen on basal half, constricted at the middle and with 3 long setae on inner margin and 4 or 5 short setae on lateral margin. Appendage 1a conspicuous and almost perfectly separated from appendage 1 in dorsal view. Appendage

Table 1. Standard measurement data of adult males. The measurements or ratios are given as ranges followed by a mean in parentheses. The numbers in parentheses below the scientific names represent the numbers of the specimens measured.

	A	B	C	D	E	F	G
	<i>Cricotopus brevis-lobus</i>	<i>Microten-dipes truncatus</i>	<i>Polypedi-lum hiroshi-maense</i>	<i>Polypedi-lum parvi-acumen</i>	<i>Rheotany-tarsus fluminis</i>	<i>Rheotany-tarsus rivulo-philus</i>	<i>Tanytarsus takahashii</i>
	(9)	(10)	(17)	(6)	(18)	(27)	(7)
BL (mm)	2.56–2.97 (2.77)	2.93–3.65 (3.33)	2.82–3.44 (3.05)	2.21–2.44 (2.34)	2.16–2.55 (2.39)	2.00–2.36 (2.16)	2.75–3.25 (3.00)
WL (mm)	1.29–1.56 (1.41)	1.45–1.87 (1.66)	1.43–1.58 (1.52)	1.13–1.19 (1.16)	1.13–1.21 (1.18)	1.08–1.27 (1.15)	1.46–1.58 (1.51)
AR	1.19–1.31 (1.24)	1.26–1.45 (1.39)	1.42–1.69 (1.53)	0.89–0.96 (0.91)	0.62–0.76 (0.69)	0.63–0.77 (0.69)	1.00–1.14 (1.06)
ER	0.76–0.83 (0.79)	0.26–0.40 (0.35)	0.29–0.38 (0.34)	0.28–0.40 (0.33)	0.23–0.32 (0.27)	0.33–0.39 (0.36)	0.64–0.75 (0.68)
so	6–10 (8.3)	9–14 (11.3)	10–14 (12.3)	7, 8 (7.5)	7–10 (8.2)	7–10 (7.9)	8–11 (9.5)
cl	8–13 (10.3)	12–17 (14.3)	12–17 (14.5)	14, 15 (14.8)	13–18 (15.9)	14–21 (17.3)	11–18 (15.2)
pn	3–5 (4.1)	1, 2 (1.3)	0	0	0	0	0
dm	17–23 (19.4)	2	12–18 (14.1)	10, 11 (10.3)	12–16 (13.7)	11–18 (15.5)	0
dl	12–18 (14.1)	6–8 (6.9)	9–14 (11.8)	7–9 (8.2)	8–12 (9.5)	7–10 (8.3)	7–10 (8.7)
sa	3–5 (3.6)	3	4–6 (4.5)	3, 4 (3.3)	1, 2 (1.1)	1	1
sc	7–10 (8.6)	7–11 (8.6)	13–21 (16.5)	4–7 (5.2)	5–7 (6.1)	4–7 (5.9)	4–6 (4.6)
sq	4–8 (6.4)	4, 6 (5.6)	6–12 (8.8)	3, 4 (3.8)	0	0	0
LR1	0.62–0.69 (0.66)	1.47–1.56 (1.50)	1.74–1.92 (1.82)	2.00–2.16 (2.08)	2.36–2.65 (2.52)	2.21–2.52 (2.35)	3.18
LR2	0.45–0.49 (0.47)	0.68–0.73 (0.71)	0.56–0.62 (0.59)	0.55–0.58 (0.56)	0.53–0.59 (0.56)	0.56–0.64 (0.60)	0.56–0.60 (0.58)
LR3	0.51–0.56 (0.54)	0.76–0.81 (0.78)	0.73–0.78 (0.75)	0.71–0.75 (0.73)	0.70–0.76 (0.72)	0.63–0.69 (0.67)	0.70–0.72
TR1	0.12–0.14 (0.13)	0.21–0.24 (0.22)	0.29–0.32 (0.31)	0.38–0.40 (0.39)	0.30–0.37 (0.35)	0.28–0.33 (0.31)	0.43
BR1	2.0, 2.1	2.4	2.2–3.1 (2.6)	3.3–3.8 (3.4)	2.6, 3.6	2.6–3.1 (2.8)	
BR2	2.6, 2.9	2.4	4.3–5.9 (5.1)	4.3–5.9 (4.6)	5.0–6.9 (6.0)	5.0–7.1 (6.0)	5.6
BR3	2.5–3.4 (3.0)	3.6, 4.0	6.1–8.3 (7.3)	8.4, 8.8	5.8, 6.6	5.4, 7.9	5.3



2a long, reaching far beyond tip of appendage 2 and with distal numerous half chitinized long setae and basal simple setae.

Size: BL 2.75–3.25 mm. WL 1.46–1.58 mm.

Type material: Holotype ♂ emerged from a sample collected at ST-12 (5 m>), 30. VIII. 1981 (KAWAI); paratypes 2♂ from the same sample as holotype, 2♂ from ST-8, 10. VI. 1982 (KAWAI), 2♂ from R-5 (5 m>), 7. VI. 1983 (KAWAI).

Discussion: This species is closely related to *Tanytarsus yunosecundus* Sasa in the body coloration and the structure of hypopygium. However, it differs from *T. yunosecundus* in that appendage 1 is conspicuously constricted at about middle and narrowed on distal half and that the inner margin of the gonocoxite is only slightly expanded medially at the base of appendage 2a. It is also distinguished by having the scutum without dorsomedial setae and extremely high LR1 (LR1 2.38, 2.43 in *T. yunosecundus* according to SASA, 1984).

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### 摘 要

太田川 (広島県) の上流から下流に亘る 12 定点で採集したユスリカ幼虫を実験室内で飼育し、これより得られた合計 97 種の雄成虫のうち、5 属 7 種の新種について記載した。さらに、このうちの 3 種については、それらの幼虫の河川環境における棲息場所に関する若干の知見を加えた。

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